

# Emphasis on Carbohydrates May Negatively Influence Dietary Patterns in Youth With Type 1 Diabetes

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**OBJECTIVE** — To assess perceptions of healthful eating and the influence of diabetes management on dietary behaviors among youth with type 1 diabetes and parents.

**RESEARCH DESIGN AND METHODS** — Youth with type 1 diabetes ( $n = 35$ ), ages 8–21 years, and parents participated in focus groups. Focus group recordings were transcribed and coded into themes. Clinical data were abstracted from the electronic medical record.

**RESULTS** — Central topics were perceptions of healthful eating and the impact of diabetes management on diet. An emphasis on limiting postprandial glycemic excursions occasionally contradicted the traditional perception of healthful eating, which emphasized consumption of nutrient-dense whole foods in favor of prepackaged choices. Whereas fixed regimens required more rigid diets, basal-bolus regimens provided more opportunities for unhealthful eating. Most youth perceived “refined” grains as more healthful grains.

**CONCLUSIONS** — For youth with type 1 diabetes and parents, an emphasis on carbohydrate quantity over quality may distort beliefs and behaviors regarding healthful eating.

*Diabetes Care* 32:2174–2176, 2009

Medical nutrition therapy for youth with type 1 diabetes is designed to maintain normal growth and development while optimizing glycemic outcomes (1,2). Even the most intensive insulin regimens cannot be successful without careful attention to meal planning (3–5). Nutrition education for youth with type 1 diabetes focuses on carbohydrate counting and overall healthful eating. However, recent data demonstrate that youth with diabetes are not meeting established nutrition guidelines (6–9).

There remains a need to understand why youth with type 1 diabetes fail to achieve nutrition guidelines. In this study, we explored perceptions of healthful eating provided by youth with type 1 diabetes and their parents and assessed the influence of diabetes management on

food choices. Findings could inform future interventions aimed at improving the nutrition of youth with type 1 diabetes.

## RESEARCH DESIGN AND METHODS

— Youth with type 1 diabetes and their parents attending a pediatric diabetes program were invited to participate. Eligible youth were 8–21 years old, with type 1 diabetes duration  $\geq 6$  months, and no disease affecting diet (e.g., celiac disease). The Committee on Human Studies approved the study protocol, and participants provided written informed consent/assent.

Parents and their children participated in separate focus groups. Youth focus groups were typically composed of similarly aged preadolescents or adolescents. A trained facilitator led each focus

group using a structured guide established by the research team, while an observer took notes on nonverbal responses. All groups were audiotaped.

Recordings were transcribed verbatim and verified by separate staff. The coding system was based on a subset of focus group transcripts. Two staff independently coded each transcript, and the entire coding team met to resolve discrepancies. Staff identified themes in the text for topics of interest (10). Relevant text was compiled using HyperRESEARCH version 2.7 (Researchware, Randolph, MA). The descriptors “most,” “some,” and “few” reflect endorsement of themes by  $>75$ ,  $25$ – $75$ , and  $<25\%$  of parent or youth focus groups, respectively (see online appendix A, found at <http://care.diabetesjournals.org/cgi/content/full/dc09-1302/DC1>). Illustrative quotes were selected to highlight central topics (see online appendix B).

The electronic medical record provided demographic and clinical information, including current A1C (reference range 4–6%).

**RESULTS** — Youth with type 1 diabetes ( $n = 35$ ) and their parents participated in 21 focus groups (12 youth, 9 parent). Participant characteristics are presented in Table 1. Central topics were perceptions of healthful eating and the impact of diabetes management on the diet of youth with type 1 diabetes.

## Perceptions of healthful eating

All participants perceived fruits and vegetables as healthful while describing “junk food” and fast food as unhealthful. Most parent groups included sufficient protein intake as part of healthful eating. More parent than youth groups reported adequate dairy and whole-grain consumption as part of healthful eating.

Both parents and youth qualified traditional perceptions of healthful eating by addressing a food's glycemic effect. As such, foods resulting in larger or more erratic postprandial glycemic excursions were considered less healthful. Most parents and some youth associated fast food and “junk food” with greater postprandial

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Received 16 July 2009 and accepted 2 September 2009. Published ahead of print at <http://care.diabetesjournals.org> on 9 September 2009. DOI: 10.2337/dc09-1302.

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Table 1—Characteristics of youth participants

	Mean $\pm$ SD or %	Range
Age (years)	15.1 $\pm$ 3.6	8.0–21.0
Sex (% female)		
Youth	51	
Parent	74	
z-BMI (SDs)	0.7 $\pm$ 0.8	–1.4 to 2.2
Diabetes duration (years)	6.4 $\pm$ 4.6	0.8–18.4
Insulin regimen (%)		
$\leq 3$ injections/day	21	
$\geq 4$ injections/day	29	
Insulin pump	50	
Insulin dose (units/kg/day)	0.8 $\pm$ 0.2	0.4–1.4
Blood glucose monitoring (checks/day)	4.5 $\pm$ 2.6	0–9
A1C (%)	8.9 $\pm$ 1.8	6.4–13.4
Focus group size (number of individuals)		
Youth	2.9 $\pm$ 0.9	2–4
Parent	3.9 $\pm$ 1.1	3–6

*n* = 35.

hyperglycemia. However, a few parents also limited, and even excluded, fruit consumption because of the risk of postprandial hyperglycemia.

Parents and youth emphasized both appropriate portion size and the ease of carbohydrate estimation in determining food choices. The relative ease afforded by nutrition labels led some parents and youth to prefer prepackaged processed foods over whole foods, such as whole grains, fruits, and legumes. Despite a few misconceptions regarding healthful eating (online appendix A), only one child believed it was more healthful to limit fiber consumption. Most youth believed “refined” grains referred to more healthful grains.

### Impact of diabetes management on diet

Parents and youth attributed greater mealtime flexibility to basal-bolus insulin regimens. Some parents and a few youth associated this greater flexibility with less healthful eating behaviors, such as more frequent snacking. One parent referred to the pump as a “double-edged sword” in reference to the benefit of flexibility coming at the cost of less healthful eating behaviors. Families using fixed insulin regimens acknowledged eating on a strict schedule and felt that consuming snacks to prevent hypoglycemia during anticipated insulin peaks was unhealthy.

Some parents reported that their child chose foods not requiring additional insulin administration. This preference for foods, presumably with little carbohy-

drate, led a few youth to consume more vegetables and an overall more healthful diet. Most participants considered “diet” foods, namely sugar-free products, as healthful alternatives.

**CONCLUSIONS**— Previous research has identified barriers to healthful eating in the general population (11–13). This study highlighted issues specific to diabetes management that could affect dietary behaviors for youth with type 1 diabetes.

Parents and their children with type 1 diabetes described healthful eating using two, sometimes contradictory, constructs. The first emphasized maximizing nutrient-dense whole food consumption. The second focused on a food’s postprandial glycemic response, emphasizing both the amount of carbohydrate and ease of carbohydrate estimation. The latter led parents to limit their child’s fruit, whole grain, and legume consumption to reduce the risk of postprandial hyperglycemia.

Our findings suggest that both fixed and flexible insulin regimens influence dietary behaviors. Basal-bolus therapy provided greater flexibility in meal planning and food choices. However, some parents and youth felt this freedom created more opportunities to consume unhealthy foods. Frequent snacking was present among youth regardless of insulin regimen.

The findings from these focus groups are strengthened by a wide age range of youth, the inclusion of various insulin regimens, and the ability to assess health

beliefs from youth with type 1 diabetes and their parents. The inclusion of patients from a single institution may limit generalizability of the findings. Nonetheless, despite a similar approach to diabetes care and nutrition education among participants, we observed varying responses.

Although families living with diabetes receive routine medical nutrition therapy, it remains difficult to balance the qualitative and quantitative aspects of healthful nutrition, especially as it relates to carbohydrate consumption. This work should inform clinical practice and behavioral interventions aimed at improving the dietary intake of youth with type 1 diabetes.

**Acknowledgments**— This study was supported by the Intramural Research Program at the Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, contract number HHSN267200703434C.

No potential conflicts of interest relevant to this article were reported.

We would like to thank Deborah Butler, Caitlin Duffy, Heidi Pound, Elizabeth Robinson, Brittany Ryan, and Miranda Theodore for their significant contributions to data collection, organization, and analysis. We are grateful to all of the families who participated in this study.

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